(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 January 2001 (25.01.2001)

PCT

(10) International Publication Number
WO 01/06787 A1

(51) International Patent Classification[7]: H04N 7/167

(21) International Application Number: PCT/US00/16240

(22) International Filing Date: 13 June 2000 (13.06.2000)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
09/352,966 14 July 1999 (14.07.1999) US

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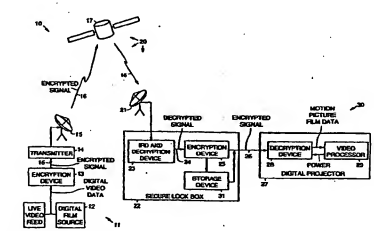
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *With international search report.*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: SECURE DIGITAL DATA DISTRIBUTION SYSTEM AND METHOD



(57) Abstract: A system and method for distributing digital video data to a remotely located motion picture viewing location (30) in a secure manner. Digital video data is encrypted (16) at a distribution facility (11). The encrypted video data (16) is transmitted by way of a data broadcasting system (11) to the remote viewing location (30). At the remote viewing location (11), the encrypted video data (16) is received by an integrated receiver and decoder (22) unit (IRD) including a decryption device (23) and is decrypted. The decrypted video data (24) is then immediately input into a second encryption device (25) which re-encrypts the video data which is optionally stored. The IRD (23) and the encryption device (25) are located inside a secured location (22), such as a lock box. The re-encrypted video data (26) is then transferred to a digital projector (27). A second decryption device (28) is located within the digital projector and decrypts the previously re-encrypted video data. The second decryption device (28) is coupled to a motherboard of the digital projector (27) by way of cables that enable it to draw power, and to couple the decrypted video data directly to the video processor used by the digital projector (27).

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SECURE DIGITAL DATA DISTRIBUTION SYSTEM AND METHOD

BACKGROUND

The present invention relates generally to the distribution of digital data, and more particularly, to a secure system and method for distributing and displaying digital data, such as digitally recorded feature length movies at remote viewing locations.

The assignee of the present invention has heretofore developed a system and method for use in distributing digitally recorded motion pictures to motion picture viewing locations, such as theaters, for viewing by an audience. This system and method is disclosed in US Patent Application Serial No. 09/245,153, filed February 4, 1999, entitled "Digital Distribution and Viewing of Feature Length Movies in Theaters" and is assigned to the assignee of the present invention.

There are concerns regarding the potential piracy and/or unauthorized interception and copying of the digitally recorded motion pictures using this system. The present invention addresses these concerns as well as those of distributing digital data for various types of applications.

Accordingly, it is an objective of the present invention to provide for a secure system and method for distributing and displaying digital data, such as digitally recorded feature length movies, at remote viewing locations.

SUMMARY OF THE INVENTION

To accomplish the above and other objectives, the present invention provides for a system and method for use in distributing digital video data, such as live video or

digitally recorded motion pictures, for example, to remotely located viewing locations, for viewing by an audience, in a secure manner in order to preclude unauthorized duplication and/or piracy. The system and method involve secure transmission of the digital video data, such as the live video or digitally recorded motion picture, by way of a data broadcasting system, which may comprise a satellite, for example, from a production or distribution facility to the remote viewing locations at which the digital video data is to be displayed. The transmission, reception and display of the digital video data (live video or digitally recorded motion picture) using a digital projector are handled in a secure manner in accordance with the principles of the present invention.

More particularly, the system and method provides for an encrypted video signal corresponding to the digital video data (live video or digitally recorded motion picture) to be generated at the production or distribution facility which is broadcast by way of the data broadcasting system to one or more remote viewing locations. At the remote viewing locations, the encrypted video signal is processed by an integrated receiver and decoder unit (IRD) including a decryption device where it is received and decrypted. The decrypted video signal then passes immediately to a second encryption device which re-encrypts the video signal. The IRD unit and the second encryption device are located inside a secured lock box. Optionally, the re-encrypted video signal may be stored in a storage device for later display. The re-encrypted signal, either from the second encryption device or storage device, is then passed to the digital projector. A decryption device located within the digital projector decrypts the re-encrypted signal transmitted from the secure lock box. The decryption device is coupled to a motherboard of the digital projector by way of cables that enable the decryption device to draw power, and to couple the decrypted video signal directly to a video processor used by the digital projector.

In an exemplary method, an encrypted video data is transmitted to a remotely located viewing location. The encrypted video data is received and decrypted at the remotely located viewing location. The decrypted video data is then re-encrypted and optionally stored. The re-encrypted video data is decrypted in a digital projector to produce the original video data. The video data is then processed to display it.

The present system and method thus provides for a secure digital video path from the production or distribution facility to the remotely located digital projector. Once the video signal corresponding to the live video or recorded motion picture is encrypted and subsequently broadcast, the signal will not be discernable by non-licensed or unauthorized viewers, and in the event the signal is intercepted, it will not be readily recoverable as viewable or otherwise useable data.

BRIEF DESCRIPTION OF THE DRAWINGS

The various features and advantages of the present invention may be more readily understood with reference to the following detailed description taken in conjunction with the accompanying drawing, wherein like reference numerals designate like structural elements, and in which:

Fig. 1 illustrates exemplary secure distribution systems in accordance with the principles of the present invention; and

Fig. 2 illustrates an exemplary secure distribution method in accordance with the principles of the present invention.

DETAILED DESCRIPTION

Referring to the drawing figures, Fig. 1 illustrates n exemplary secure distribution systems 10 in accordance with the principles of the present invention for use in distributing live or prerecorded video data in a secure manner to a remote viewing location. The exemplary embodiments of the system 10 shown in Fig. 1 are used to distribute live or prerecorded video data, such as a digitally recorded motion picture, for example, to a remotely located viewing location 30, such as a theater, for viewing by an audience. The secure distribution system 10 distributes the live or prerecorded video data, such as the digitally recorded motion picture, in a secure manner to preclude unauthorized duplication and/or piracy.

The system 10 is used to distribute live or recorded data that must be transmitted in a secure manner to the remote location. Typical applications include electronic cinema applications, corporate communication applications, automobile industry applications, retail applications, and banking applications, for example. The present system 10 ensures that the transmitted data is secure at substantially all points during transmission and reception at the remote location, and whether or not the data is viewed or stored at the remote location.

The exemplary secure distribution system 10 shown in Fig. 1 comprises a data broadcasting system 20, which may comprise a satellite 17, for example, which is used to distribute the digitally recorded motion picture from a production or distribution facility 11 to the remote viewing locations 30 at which the motion picture is to be displayed. An exemplary data broadcasting system 20 is one operated by CyberStar, L.P. The production or distribution facility 11 generates a live video feed or includes a digital film storage source 12 which stores the digitally recorded motion picture. The live video feed is input to, or the digital film storage source 12 is coupled to, a first encryption device 13 which is used to produce an encrypted digitally recorded motion picture 16 or encrypted video feed. An exemplary first encryption device 13 is a model

MV12 manufactured by Divicom, for example. The first encryption device 13 is coupled to a transmitter 14 that transmits the encrypted digitally recorded motion picture 16 or encrypted video feed by way of an antenna 15 to the satellite 17.

The satellite 17 in turn retransmits the encrypted digitally recorded motion picture 16 or encrypted video feed to the remote viewing location 30. The remote viewing location 30 comprises a receiving antenna 21 for receiving the encrypted digitally recorded motion picture 16 or encrypted video feed. A receiver 23, such as an integrated receiver and decoder unit (IRD) 23, including a decryption device, is disposed in a secure lock box 22, or other physically secure location. An exemplary integrated receiver and decoder unit (IRD) 23 containing the decryption device is a model DSR-2700 CAS manufactured by Samsung, for example. The integrated receiver and decoder unit (IRD) 23 receives and decrypts the encrypted digitally recorded motion picture 16 or encrypted video feed. A second encryption device 25 is also disposed in the secure lock box 22. An exemplary second encryption device 25 is a model VES-TL manufactured by Macrovision, for example. The second encryption device 25 processes the decrypted signal to provide a re-encrypted signal 26. The re-encrypted signal 26 is input to a digital projector 27. An exemplary digital projector 27 is a model VistaGRAPHX 4000 manufactured by Electrohome, for example.

The digital projector 27 comprises a second decryption device 28 that decrypts the re-encrypted signal 26. An exemplary second decryption device 28 is a model VES-TL manufactured by Macrovision, for example. The decrypted output of the second decryption device 28 comprises the digitally recorded motion picture or video feed that is input to a video processor 29 of the digital projector 27, which processes the video data to display the digitally recorded motion picture or video feed.

The second decryption device 28 is preferably coupled to a motherboard of the digital projector 27 by way of cables that enable the second decryption device 28 to draw power, and to couple the decrypted video signal directly to the video processor 29 of the digital projector 27.

In an alternative embodiment, a storage device 31 is coupled to the output of the encryption device 25 and stores the re-encrypted digitally recorded motion picture or video feed for later viewing. The storage device 31 is disposed in the secure lock box 22. When the digitally recorded motion picture or video feed is to be displayed, it is transferred from the storage device 31 as the encrypted signal 26 to the decryption device 28 in the digital projector 27, which in turn displays the video data.

Fig. 2 illustrates an exemplary secure distribution method 40 in accordance with the principles of the present invention for distributing video data, such as a digitally

recorded motion picture, to a remotely located motion picture viewing location 30. The secure distribution method 40 comprises the following steps.

Video data, such as a digitally recorded motion picture, for example, is encrypted 41 using an encryption device 13. The encrypted video data or digitally recorded motion picture, is then transmitted 42 by way of a data broadcasting system 20, which may comprise a satellite 17, for example to the remotely located viewing location 30.

At the remotely located viewing location 30, the encrypted video data or digitally recorded motion picture is received 43 and decrypted 44 in a secure location 22, such as with equipment located in a secure lock box 22, for example. The decrypted video data or digitally recorded motion picture is then re-encrypted 45 in the secure location 22 and optionally stored 46. When viewing is desired, the re-encrypted video data or digitally recorded motion picture transferred 47 to a digital projector 27. In the digital projector 27 the re-encrypted video data or digitally recorded motion picture is decrypted 48 to produce the original video data or digitally recorded motion picture. The video data or digitally recorded motion picture is then processed 49 to display it to an audience.

Thus, a secure system and method for distributing and displaying video data at remote viewing locations have been disclosed. It is to be understood that the above-described embodiments are merely illustrative of some of the many specific embodiments that represent applications of the principles of the present invention. Clearly, numerous and other arrangements can be readily devised by those skilled in the art without departing from the scope of the invention.

CLAIMS

What is claimed is:

1. A secure distribution system for use in distributing a digital video signal to a remotely located viewing location, comprising:

a distribution facility comprising a first encryption device for encrypting the digital video signal, and a transmitter for transmitting the encrypted digital video signal;

a data broadcasting system for distributing the transmitted encrypted digital video signal from the distribution facility to a remotely located viewing location; and

the remotely located motion picture viewing location comprising:

a receiver including a decryption device disposed in a secure location for receiving and decrypting the encrypted digital video signal;

a second encryption device disposed in the secure location for re-encrypting the decrypted signal; and

a digital projector comprising a second decryption device for decrypting the re-encrypted signal to produce the digital video signal, and a video processor for processing the digital video signal for display.

2. The system recited in Claim 1 wherein the data broadcasting system comprises a satellite.

3. The system recited in Claim 1 wherein the transmitter is coupled to a transmitting antenna.

4. The system recited in Claim 1 wherein the integrated receiver and decoder unit is coupled to a receiving antenna.

5. The system recited in Claim 1 wherein the receiver comprises an integrated receiver and decoder unit.

6. The system recited in Claim 1 further comprising:

one or more cables coupled between the second decryption device and a motherboard of the digital projector and to the video processor that enable the second decryption device to draw power, and to couple the decrypted video signal directly to the video processor.

7. A secure distribution system for use in distributing a digitally recorded motion picture to a remotely located motion picture viewing location, comprising:

a distribution facility comprising a digital film storage source for storing the digitally recorded motion picture, a first encryption device for encrypting the digitally recorded motion picture, and a transmitter for transmitting the encrypted digitally recorded motion picture;

a data broadcasting system for distributing the transmitted encrypted digitally recorded motion picture from the distribution facility to a remotely located motion picture viewing location; and

the remotely located motion picture viewing location comprising:

a receiver including a decryption device disposed in a secure location for receiving and decrypting the encrypted digitally recorded motion picture;

a second encryption device disposed in the secure location for re-encrypting the decrypted signal; and

a digital projector comprising a second decryption device for decrypting the re-encrypted signal to produce the digitally recorded motion picture, and a video processor for processing the digitally recorded motion picture for display.

8. The system recited in Claim 7 wherein the data broadcasting system comprises a satellite.

9. The system recited in Claim 7 wherein the transmitter is coupled to a transmitting antenna.

10. The system recited in Claim 7 wherein the integrated receiver and decoder unit is coupled to a receiving antenna.

11. The system recited in Claim 7 wherein the receiver comprises an integrated receiver and decoder unit.

12. The system recited in Claim 7 further comprising:

one or more cables coupled between the second decryption device and a motherboard of the digital projector and to the video processor that enable the second decryption device to draw power, and to couple the decrypted video signal directly to the video processor.

13. A secure distribution method for distributing a digital video signal to a remotely located viewing location, comprising the steps of:

encrypting a digital video signal;

transmitting the encrypted digital video signal to the remotely located viewing location;

receiving and decrypting the encrypted digital video signal at the remotely located viewing location;

re-encrypting the decrypted digital video signal;

transferring the re-encrypted digital video signal to a video projector;

decrypting the re-encrypted digital video signal in the digital projector to produce the original digital video signal; and

processing the decrypted digital video signal to display it.

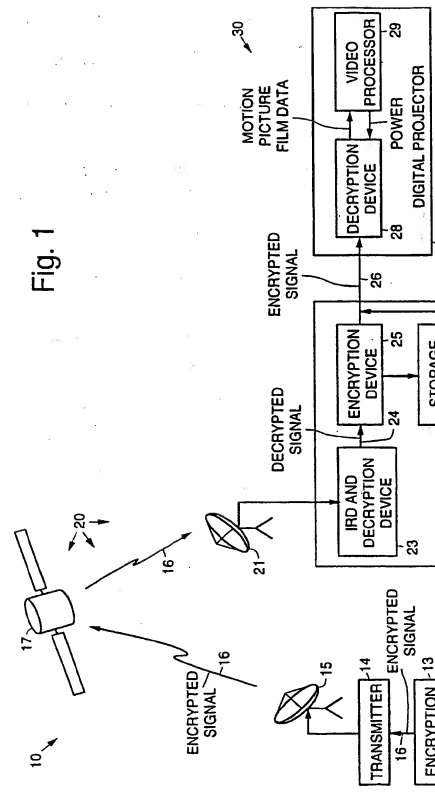
14. The method recited in Claim 13 wherein the digital video signal comprises a digitally recorded motion picture.

15. The method recited in Claim 13 wherein the digital video signal comprises a live video feed.

16. The method recited in Claim 13 wherein the transmitting step comprises the step of transmitting the encrypted digitally recorded motion picture by way of a satellite.

17. The method recited in Claim 13 further comprising the step of storing the re-encrypted digital video signal.

Fig. 1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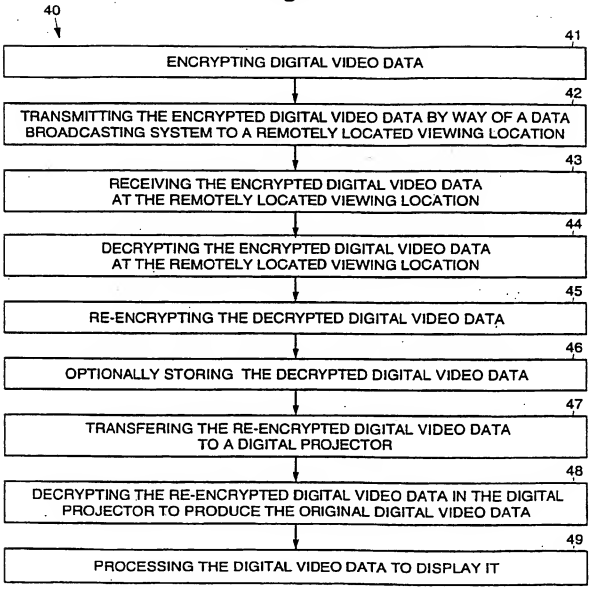
LIVE VIDEO FEED
DIGITAL FILM SOURCE
DIGITAL VIDEO DATA
ENCRYPTION DEVICE
ENCRYPTED SIGNAL
TRANSMITTER
ENCRYPTED SIGNAL
IRD AND DECRYPTION DEVICE
DECRYPTED SIGNAL
ENCRYPTION DEVICE
STORAGE DEVICE
SECURE LOCK BOX
ENCRYPTED SIGNAL
DECRYPTION DEVICE
VIDEO PROCESSOR
POWER
DIGITAL PROJECTOR
MOTION PICTURE FILM DATA

Fig. 2



INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/16240

A. CLASSIFICATION OF SUBJECT MATTER
IPC(7) :H04N 7/167
US CL : 380/210
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 380/200,201,205,208,210,216,230,233; 705/51,57;713/200

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NPL

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Copernic (www) search, EAST, WEST, IEEE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,699,426 A [TSUKAMOTO] 16 December 1997, col. 4 lines 17-27, Fig. 5 all.	1-17
A	US 5,457,746 A [DOLPHIN] 10 October 1995 Entire Document	1-17
A	US 5,677,953 A [DOPLHIN] 14 October 1997 Entire Document	1-17
A	US 5,818,933 A [KAMBE et al.] 06 October 1998 Entire Document	1-17
A	US 5,848,158 A [SAITO et al.] 08 December 1998 Entire Document	1-17

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance		
"E"	earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search 15 SEPTEMBER 2000	Date of mailing of the international search report 25 OCT 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer PAUL E. CALLAHAN Telephone No. (703) 305-1336

Form PCT/ISA/210 (second sheet) (July 1998)*